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Bayesian Hierarchical Model for Cost-Effectiveness Evaluation of Public Health Surveillance Systems in South Africa, 2013

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Abstract

Public health surveillance systems in South Africa have been established to monitor diseases and outbreaks effectively. However, their cost-effectiveness remains a subject of debate. A Bayesian hierarchical model was employed to assess the financial impact and efficacy of these systems across different regions. The model accounts for variability among surveillance units and incorporates prior knowledge about system performance. The analysis revealed that certain regions benefited from surveillance systems more than others, with a significant proportion (35%) showing cost savings over traditional methods. This study provides evidence on the effectiveness of public health surveillance systems in different geographical contexts and highlights areas where improvements can be made. Public health authorities should prioritise investment in surveillance systems based on their economic benefits, particularly in regions with higher disease prevalence. Bayesian hierarchical model, cost-effectiveness analysis, public health surveillance, South Africa Treatment effect was estimated with $text\{logit\}(\pi) = beta 0 + \vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, Bayesian, Hierarchical, Model, Evaluation, Surveillance, Cost-Benefit*

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